

IS 6213 (Part 15) : 2013

(Reaffirmed 2018)

भारतीय मानक

लुगदी के लिए परीक्षण पद्धति

भाग 15 मैंगनीज सामग्री ज्ञात करना

(पहला पुनरीक्षण)

*Indian Standard*

**METHODS OF TEST FOR PULP**

**PART 15 DETERMINATION OF MANGANESE CONTENT**

*( First Revision )*

ICS 676.1: 676.014.2 : [546.711]

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**BUREAU OF INDIAN STANDARDS**  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

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Price Group 2

## FOREWORD

This Indian Standard (Part 15) (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Paper and Its Products Sectional Committee has been approved by the Chemical Division Council.

Copper, iron and manganese, if present in pulp in more than traces, not only discolour it but may also affect its dyeing properties. It is, therefore, essential to know the quantities of each of these in the pulp.

This standard (Part 15) which was prepared mainly based on ISO/R 1830 : 1970 'Pulps — Determination of manganese' first published in 1975. As this version was very old, decision has been taken for its revision to update the standard. It is for information that International Organization for Standardization (ISO) has published a standard ISO 12830 : 2011 'Paper, board and pulp — Determination of acid-soluble magnesium, calcium, manganese, iron, copper, sodium and potassium'. As this ISO method is for paper, board and pulp and IS 6213 (Part 15) prescribes method of test for pulp only, the Committee decided to adopt ISO 12830 : 2011 'Paper, board and pulp — Determination of acid-soluble magnesium, calcium, manganese, iron, copper, sodium and potassium' as dual number standard in future.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

*Indian Standard*

# METHODS OF TEST FOR PULP

## PART 15 DETERMINATION OF MANGANESE CONTENT

( *First Revision* )

**1 SCOPE**

This standard (Part 15) prescribes the method for the determination of manganese content of pulp.

**2 REFERENCES**

The standards listed below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

<i>IS No.</i>	<i>Title</i>
1070 : 1992	Reagent grade water ( <i>third revision</i> )
6213 (Part 7) : 1971	Methods of test for pulp: Part 7 Ash content in pulp

**3 PRINCIPLE**

The pulp is ashed and dissolved in nitric acid. Manganese is oxidized to permanganate with sodium periodate followed by colorimetric determination by measuring the optical density at 525 nm.

**4 QUALITY OF REAGENTS**

Unless otherwise specified, pure chemicals and distilled water (*see* IS 1070), freshly boiled and cooled, shall be employed in the tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of test.

**5 REAGENTS**

**5.1 Sodium Sulphite Solution ( $\text{Na}_2\text{SO}_3$ )** — 50 g/l.

**5.2 Nitric Acid** — 1.5 M. Prepared by diluting 100 ml of nitric acid (r.d. 1.4) to 1 litre.

**5.3 Periodate-Phosphoric Acid Solution** — 50 g of sodium periodate ( $\text{NaIO}_4$ ) and 200 ml of 85 percent phosphoric acid ( $\text{H}_3\text{PO}_4$ ) per litre.

**5.4 Standard Manganese Solution** — 0.1 mg of manganese per millilitre. Weigh 0.274 9 g of manganese sulphate ( $\text{MnSO}_4$ ), dried at 300°C, into a 1 litre volumetric flask. Dissolve with water and dilute to the mark.

**6 APPARATUS**

**6.1 Dishes**, of platinum, porcelain or quartz.

**6.2 Spectrometer or Filter Colorimeter**

**6.3 Cells**, for use in the spectrophotometer or filter colorimeter.

**6.4 Weighing balance**, of suitable capacity having least count 0.01 mg.

**7 CALIBRATION**

**7.1** Dilute the standard manganese solution ten times so that 1 ml corresponds to 0.01 mg of manganese. Pipette aliquots of 1, 2, 5 and 10 ml of the diluted solution into 25 ml volumetric flask. Without any further dilution heat the solutions by placing the flasks in a steam-bath and add 1 ml of the periodate-phosphoric acid solution to each flask. Keep the flasks in the steam-bath for 5 min after the addition and then dilute to the mark. Cool to  $20 \pm 2^\circ\text{C}$  and adjust the volume. The temperatures of the solutions in the series should not differ by more than  $3^\circ\text{C}$ . Measure the optical density at 525 nm with a solution containing 1 ml of periodate-phosphoric acid solution and 24 ml of water as a reference. Divide the reading by the length of the cell.

**7.2** The manganese concentrations of the coloured solutions are 0.4, 0.8, 2.0 and 4.0 mg of manganese per litre respectively. Plot the optical density values divided by the length of the cell against the manganese concentrations, and check that the points lie on a straight line going through the origin.

**8 PREPARATION OF THE SAMPLE**

Tear the air-dry sample into pieces of suitable size. Do not use cut or punched edges or other parts where metallic contamination may have occurred.

**9 PROCEDURE****9.1 Preparation of Test Sample**

Weigh to the nearest 0.01 g about 20 g of pulp (or 10 g for manganese contents above 5 mg/kg) into a dish. At the same time weigh out a separate test sample for the determination of dry matter content.

## 9.2 Determination

Ash the test sample as described in IS 6213 (Part 7). Add three drops of sodium sulphite solution to the ash and dissolve in a maximum of 5 ml of nitric acid. Place the dish on a steam-bath and evaporate to dryness.

**9.2.1** Add a few drops of nitric acid and transfer the contents of the dish with the aid of water to a 25 ml volumetric flask. Heat the contents by placing the flask in a steam-bath. Add 1 ml of the periodate-phosphoric acid solution and let the flask remain in the steam-bath for 5 min after the addition. Dilute with water to the mark, cool to  $20 \pm 2^\circ\text{C}$  and again adjust the volume to the mark. The temperature should not differ by more than  $3^\circ\text{C}$  from that of the manganese solutions used for the calibration. If necessary, centrifuge the solution (*see* Note). Measure the optical density at 525 nm with a solution containing 1 ml of periodate-phosphoric acid solution and 24 ml of water as a reference. Divide the reading by the length of the cell.

NOTE — If the solution is turbid, the turbidity may be removed by centrifuging.

## 10 CALCULATION

Carry out two determinations and calculate the manganese content, expressed as milligrams per kilogram of pulp, by the following formula:

$$\text{Manganese content, in mg/kg} = \frac{a \times V}{m}$$

(parts per million)

where

- $a$  = the amount of manganese in milligrams per litre of coloured solution, obtained from the optical density values and the calibration curve;
- $V$  = volume of the coloured solution, in ml; and
- $m$  = mass of pulp, calculated on an oven dry basis, in g.

Report the result as the mean of the two determinations to the first decimal place.

NOTE — The precision of the method as such is high. Thus, the difference between results of duplicate tests is usually attributable to uneven distribution of the trace metal in the pulp.

## 11 TEST REPORT

The test report should give the following information:

- Precise identification of the sample;
- The results and the form in which they are expressed;
- Any particular points observed in the course of the test; and
- Any details of procedure not specified in this standard, or optional, which might affect the results.

**ANNEX A***(Foreword)***COMMITTEE COMPOSITION****Paper and Its Products Sectional Committee, CHD 15**

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### Amendments Issued Since Publication

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### BUREAU OF INDIAN STANDARDS

#### Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones : 2323 0131, 2323 3375, 2323 9402

Website: [www.bis.org.in](http://www.bis.org.in)

#### Regional Offices:

#### Telephones

Central	: Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	{ 2323 7617 2323 3841
Eastern	: 1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi KOLKATA 700054	{ 2337 8499, 2337 8561 2337 8626, 2337 9120
Northern	: SCO 335-336, Sector 34-A, CHANDIGARH 160022	{ 260 3843 260 9285
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